## Laptop underbody lighting

### Preface

The term underbody lighting comes from the field of car tuning and means the optical embellishment underneath a motor vehicle with light sources. Tuning and modding are two often used terms when talking about changes in PC hardware that are not absolutely necessary. For example, equipping a desktop PC with neon tubes does not change the performance of the computer. Nevertheless, modifications, such as a water cooling system, can be explicitly installed, which primarily aims to give the computer more power. In this documentation, a simple LED light strip is installed underneath a laptop and will serve as a basis for further modifications.

### Materials

For this project we need some materials, but fortunately all of them are not expensive. Once the LED tape I ordered from a wholesaler. You just have to see what the best providers on the net are. From country to country there are differences e.g. in import regulations and customs. Abrasive paper, a small file and wire stripper should always be at hand for smaller jobs. A black marker, sewing thread, scissors, adhesive tape and insulating tape can be bought quickly in the local hardware shop or ordered on the Internet. Thin cables can be removed from old hardware or bought as rolls. Tweezers and screwdrivers should be included. If available, a digital caliper gauge should be used, but it also works with a folding rule.

### Realisation

This documentation is intended for experienced users, e.g. you must have soldered several times already, the technical procedure is not described in more detail here. Although this modification seldom causes major damage to the laptop, it should be remembered that this will still be an intervention in the device and the warranty will automatically expire. You cannot exchange your laptop after the modification.

As exact planning is required, it is necessary to examine the working environment more closely beforehand. In this project, this is the underside of the laptop to which the LED light strip is attached and wired. Pay attention to possible obstacles or other sources of interference. The strip should not be glued over open slots of fans, because otherwise they will not receive any air supply. Channels for screws, edges of cover plates or rubber studs must also be outside the working area. Even if this is not so clear before, there are quite a few places that cannot be edited without restricting the function of the device. Areas that cannot be processed must be scheduled and, if necessary, removed or bridged. Only in very rare cases do you have to bypass the point and find another solution.



In the first version, the LED light strip is connected via the USB port integrated in the laptop. Since this is an override method until the next version, it does not matter what the mod will look like. Since the LED strip is Chinaware, it is important to test it extensively in continuous operation so that it can be removed quickly in an emergency. Should the endurance test lead to a positive result, further modifications will be made to integrate the remaining cabling inside the laptop. In the following pictures you can see the other connections and the grill of the processor fan.

In order to be able to work with concrete numbers during planning, the width of the workpiece must be measured. This is done with the digital caliper gauge and is

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0.8 mm (d(″) = 0.8mm / 25.4 = 0.031496062992")
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In project work it is not only important to measure accurately, but also to adhere properly later on. Especially in technical professions, a deviation of 0.1 mm on workpieces can have a negative effect. In science, even smaller details have to be considered when, for example, in the European Organization for Nuclear Research (CERN) components for the Antiproton Accumulator have to be developed, exchanged, extended in their function or repaired.

In order to be able to put on the lasts properly, a technique is used which is also used by bricklayers. Sewing thread is laid horizontally on the laptop and measured like a mason's cord. It is important to set orientation points and to place the yarn on the outside first. Here the many rubber studs were taken as points with which one can work. The sewing thread is fixed at the ends with adhesive tape. The digital measuring device is used again to determine the width. In order to get an exact overview of the required lengths, the tape is created for testing and the places are marked with a marker, which are later cut through with scissors.
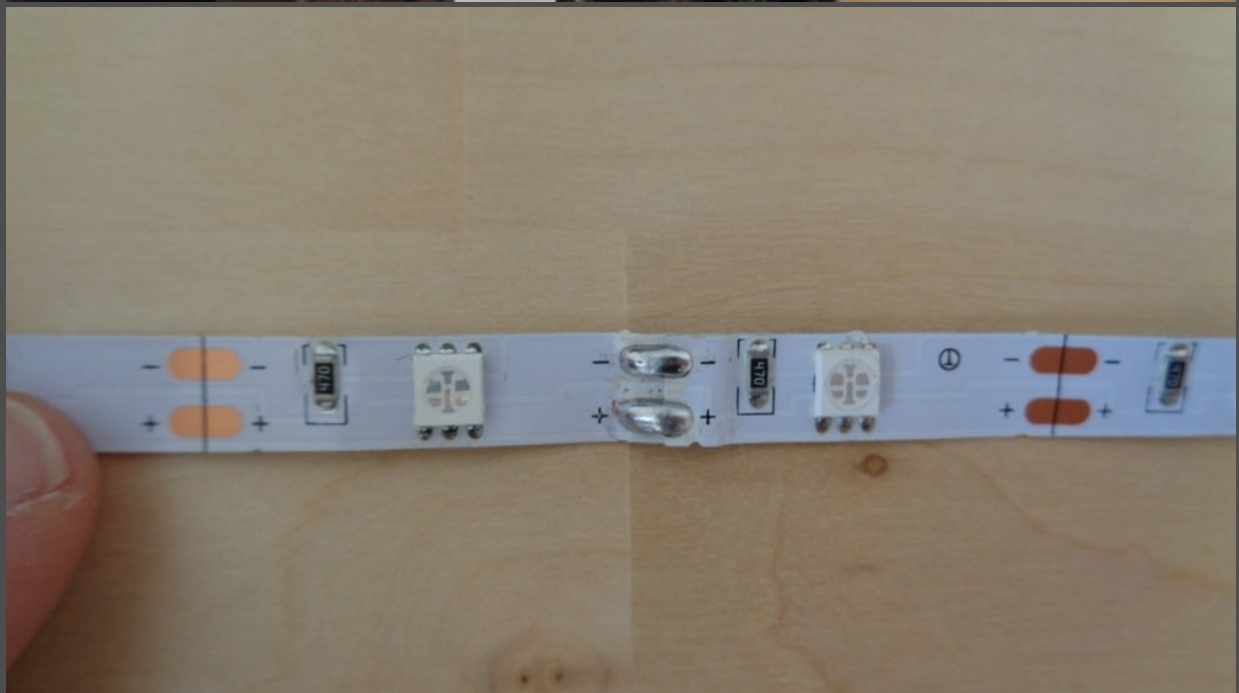
Here, the LED strip was soldered together in production, as this area has too large solder points, it is better to cut out this damaged area. Since the tape has to be split anyway, this little piece can

be taken out of the project without hesitation. It can be placed in the crate with used components for later use and does not have to go straight into the waste bin.
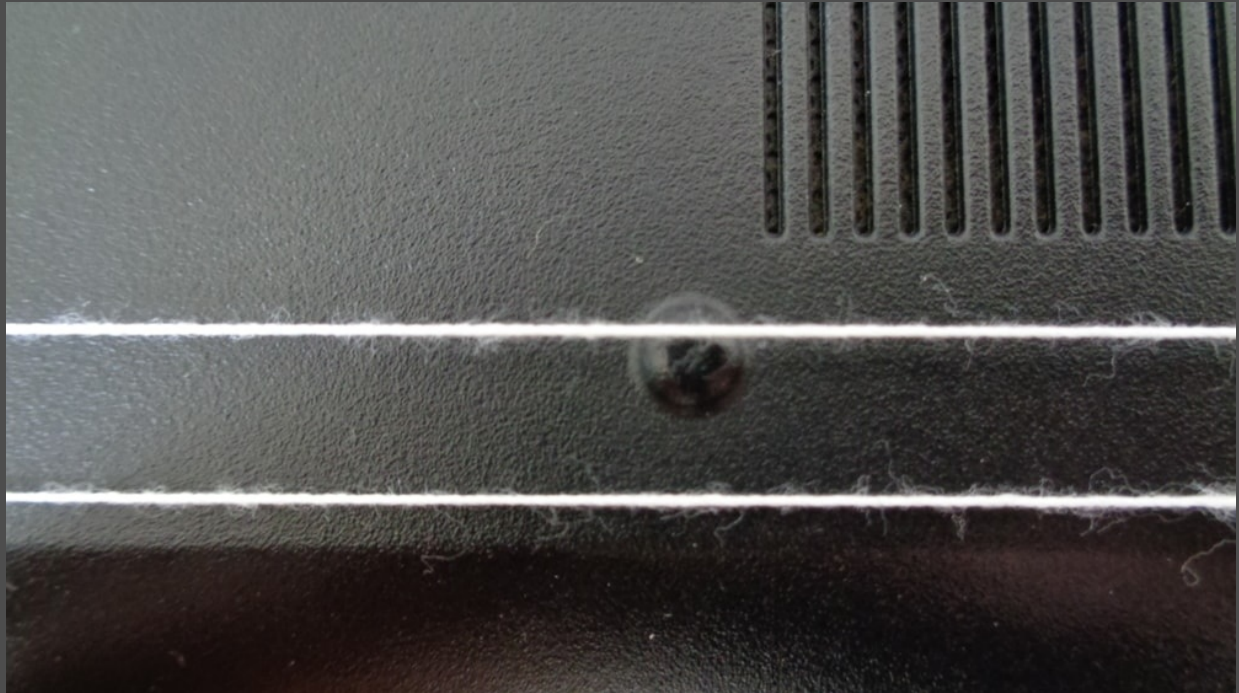


By applying the sewing thread, a small bulge was detected on a cover flap. This is located in the area for the LED strip and must be removed. As it has to be checked whether this is technically feasible, the cover flap is removed with a screwdriver and examined in more detail. It can be seen on the inside that the huckle does not perform any important functions. This can be sanded off with a small file and the abrasive paper and it will again be possible to guide the belt properly.

After the repair not much of the small shim is to be seen any more, and it can be begun with the gluing of the LED tape. For this purpose, the protective film is removed on the back and the

adhesive surface is exposed. This is then applied straight to the tensioned sewing thread. Make sure that the adhesive tape does not stick to the yarn.
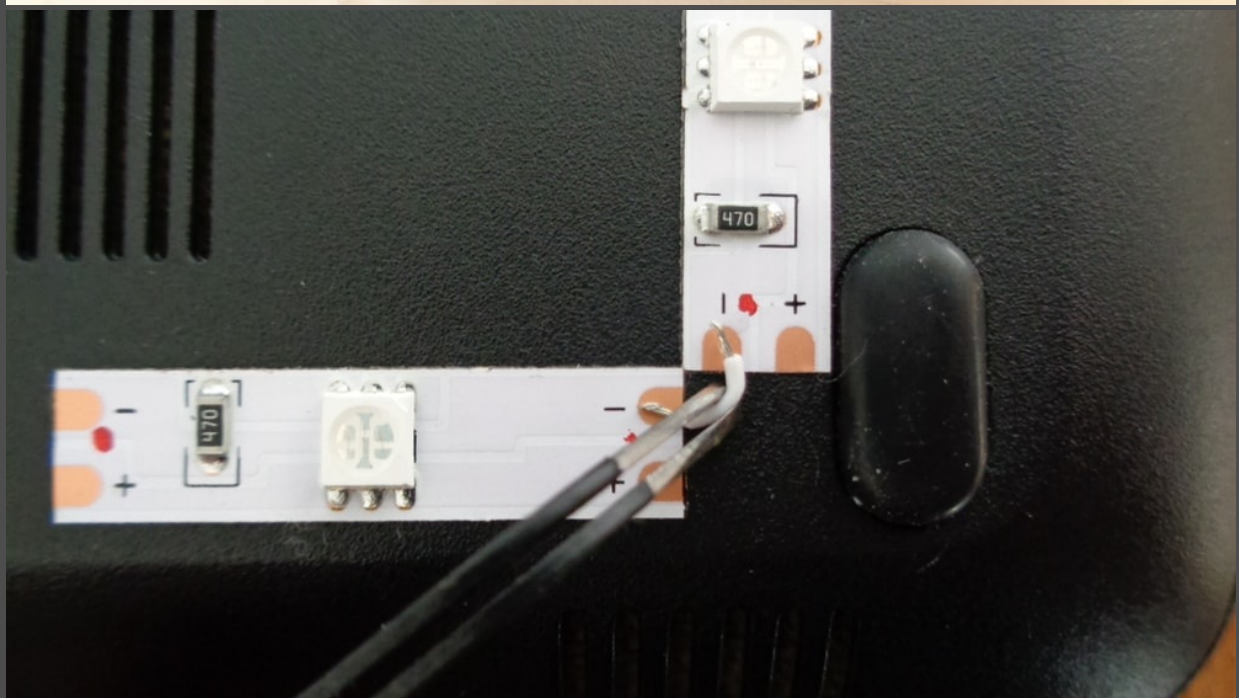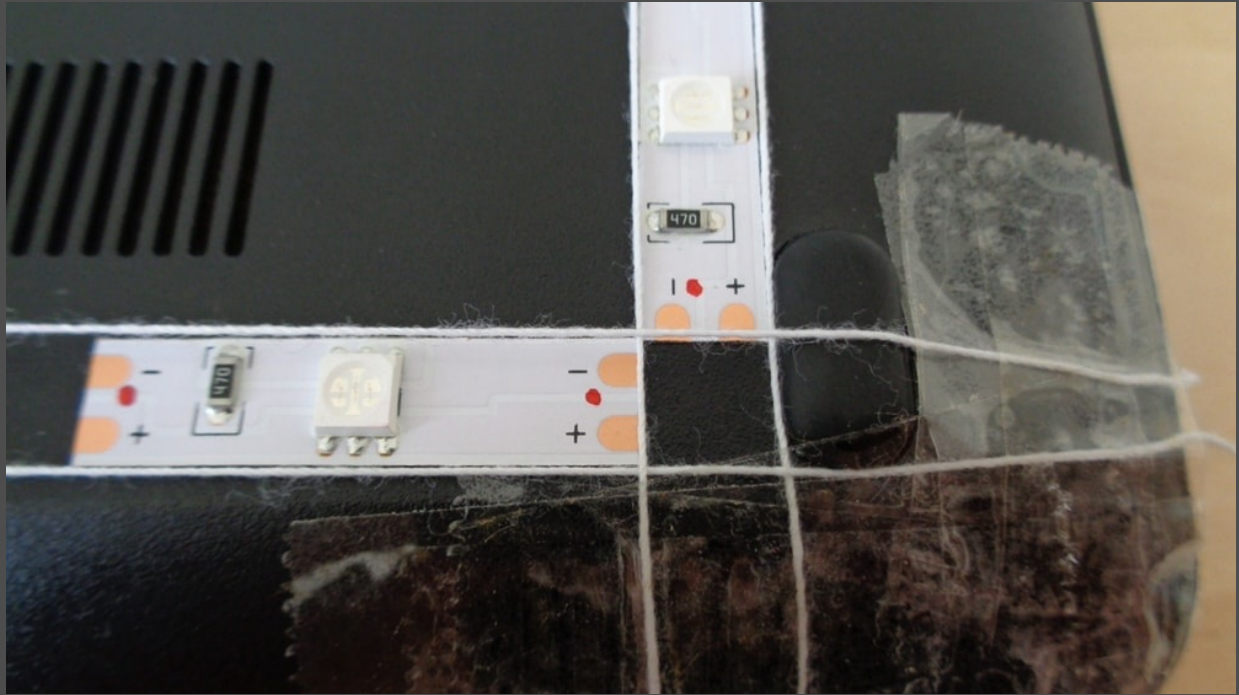
In the next steps, the cables are soldered to the individual ends of the LED strips and must be cut to the appropriate length and the ends processed with the wire stripper. To check the length and to avoid errors during the soldering process, they are created for testing and arranged on the working plate in the correct order. Repeat the individual steps in the order in which they are performed: (1) Lay the strands and measure the length. (2) Cut the wire after measurement. (3) Strip the ends of the wire. (4) Solder on solder terminals. (5) Solder on the wire. (6) Solder the wire on the LED strip.
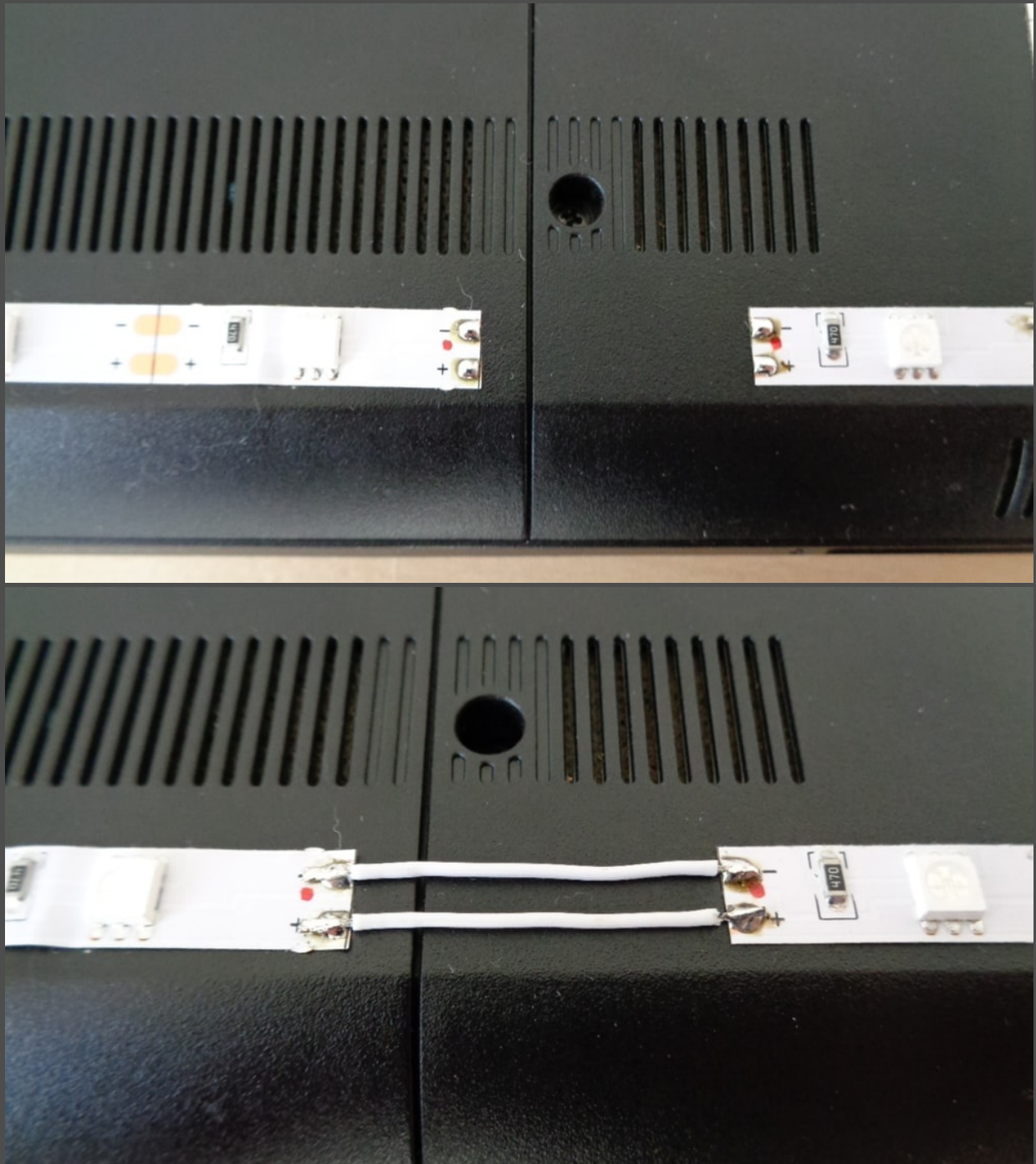
The first functional tests of the soldered LED strip attached to the underside of the laptop have been positive. In the event of malfunctions, possible sources of error must be sought at this point, for which a multimeter can be helpful. Since the strip is produced in white, it is noticeable when it is fitted. This can be covered a little with black insulating tape. The modification then no longer catches the eye immediately and overall it looks a little more professional.

## Conclusion

More time was included in the planning than was required to carry out the project. There were also no significant complications, and the modification of the cover plate was also neatly implemented. Although there is no connector system yet, and the external connection to the USB port is sufficient for a feasibility test, these points must be processed in another project. Even if modifications with light sources are of a more optical than functional nature, some information can be taken from this documentation. For example, visual effects for one's own projects are positive and should also be used to a discreet extent.